Hadronic Dark Matter Searches at CMS at $\sqrt{s} = 13$ TeV

Subtitle

By

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A dissertation submitted to the University of Bristol in accordance with the requirements for award of the degree of Doctor of Philosophy in the Faculty of Science.

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Word count: number in words

Abstract

Here goes the abstract

Dedication and acknowledgements

Here goes the dedication.

Author's declaration

I declare that the work in this dissertation was carried out in accordance with the requirements of the University's *Regulations and Code of Practice for Research Degree Programmes* and that it has not been submitted for any other academic award. Except where indicated by specific reference in the text, the work is the candidate's own work. Work done in collaboration with, or with the assistance of, others, is indicated as such. Any views expressed in the dissertation are those of the author.

SIGNED: ..... DATE: .....

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Chapter 1

Introduction

Begins a chapter. Example: When the beloved cellist (Christopher Walken - outstanding) of a world-renowned string quartet receives a life-changing diagnosis, the group's future suddenly hangs in the balance: suppressed emotions, competing egos and uncontrollable passions threaten to derail years of friendship and collaboration. Featuring a brilliant ensemble cast (including Philip Seymour Hoffman, Catherine Keener and Mark Ivanir as the three other quartet members), it is a fascinating look into the world of working musicians, and an elegant homage to chamber music and the cultural world of New York. The music, of course, is ravishing (the score is the work of regular David Lynch collaborator Angelo Badalamenti): A Late Quartet hits all the right notes.

1.1 Section

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1.1.1 Subsection

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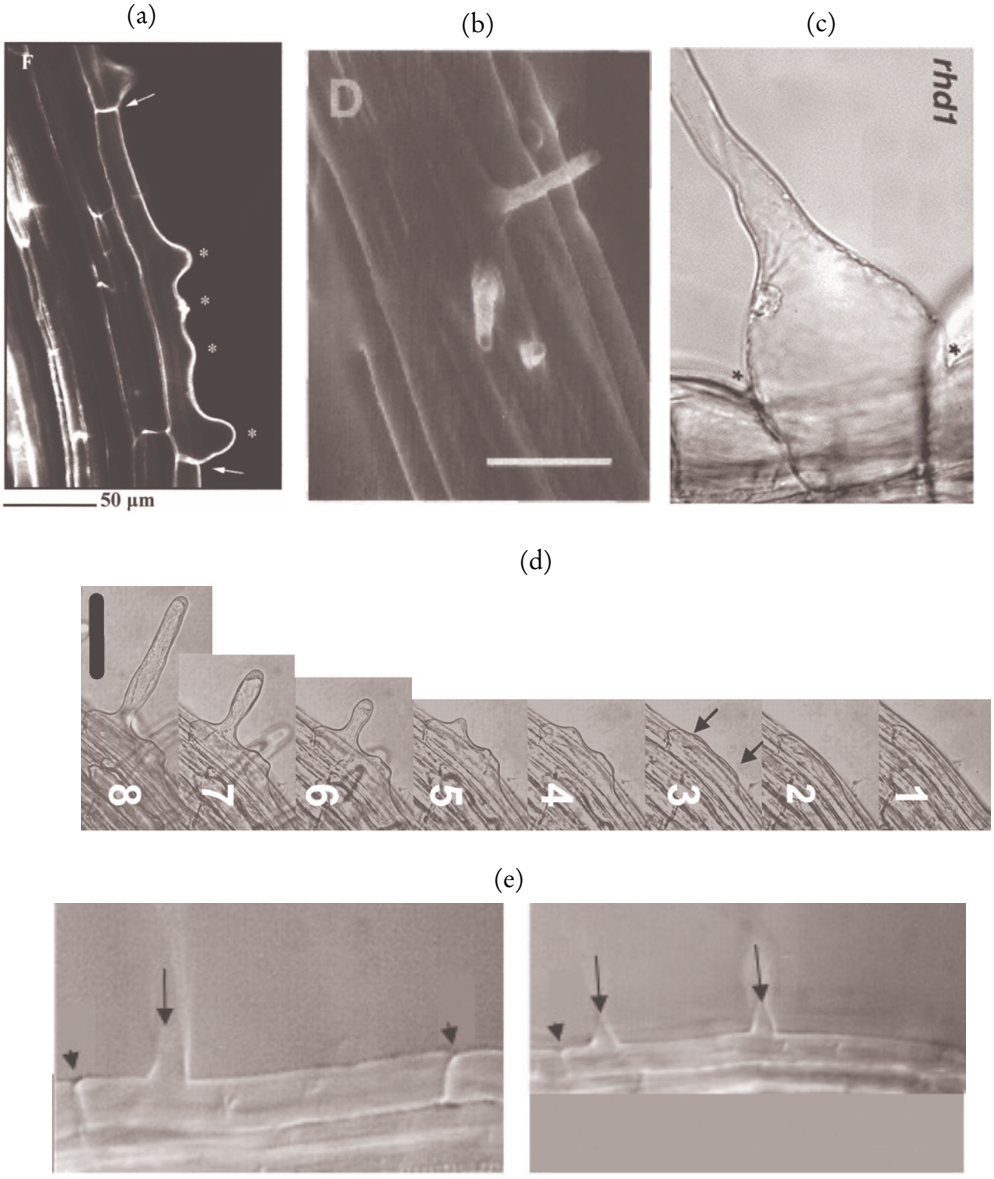

FIGURE 1.1. (a) A mutant RH cell. Asterisks show multiple sites of RH initiation in a single root hair cell (indicated by the arrows). Figure reproduced from [?]. (b) Hair-forming cell with three RH initiation locations. The bar represents $50\mu m$. Figure reproduced from [?]. (c) Large bump in mutant *rhd1*. Figure reproduced from [?]. (d) Mutant overexpressing gene *ROP2*; from right-hand to left-hand, numbers indicate progressive snapshots at different times. RH initiation sites are indicated by the arrows. The bar represents $75\mu m$. Figure reproduced from [?]. (e) Mutants affected by auxin. On the left-hand side, RH site is farther away from the apical end (left arrow cap); on the right-hand side, multiple RH locations (arrows). Figure reproduced from [?].

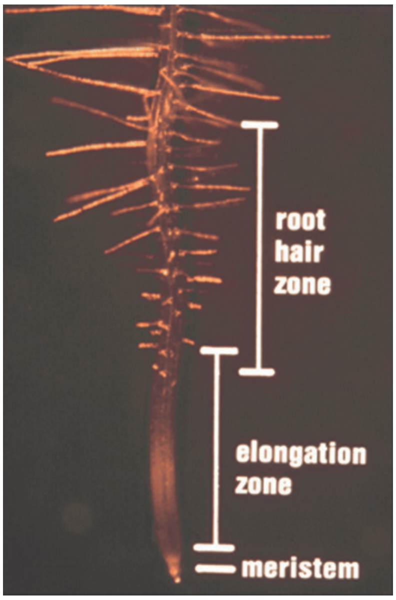

Figure 1.2. Developmental zones of an Arabidopsis root. Figure reproduced from [?].

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Also testing glossaries: latex, Large Hadron Collider, LHC, Large Hadron Collider (LHC).

Also testing references: [2] (article), [4] (book), [3] (inproceedings), [1] (techreport).

Testing numbers: 1234567890

Testing alphabet: The quick brown fox jumps over the sleazy dog

Testing equations:

$$B(P) = \frac{\mu_0}{4]pi} \int \frac{I \times \hat{r}}{\bar{r}^2} dr \tag{1.1}$$

Appendix A

Begins an appendix

Bibliography

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[2] ——, *A search for new phenomena in pp collisions at $\sqrt{s}$ = 13 TeV in final states with missing transverse momentum and at least one jet using the α_T variable*, Submitted to: Eur. Phys. J. C, (2016).
CMS-SUS-15-005, CERN-EP-2016-246.

[3] M. Lisanti, *Lectures on Dark Matter Physics*, in Proceedings, Theoretical Advanced Study Institute in Elementary Particle Physics: New Frontiers in Fields and Strings (TASI 2015): Boulder, CO, USA, June 1-26, 2015, 2017, pp. 399–446.

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Glossary

latex Is a mark up language specially suited for scientific documents.

Acronyms

LHC Large Hadron Collider.